COVER PAGE

A proposal submitted for projects in the Florida Keys National Marine Sanctuary or Southeast Florida:

Project Title: A strategic approach to evaluating the role of endocrine disrupting chemicals on the south Florida marine environment with an analysis of current knowledge, informational gaps, and research needs.

Principal Investigator(s): Robert Glazer

Date Submitted: 6/21/2018 Proposed Start Date: 1 October 2018

We, the undersigned, certify that, in the event this proposal is accepted whole or in part, our signatures on this proposal constitute intended acceptance of and compliance with applicable policy, rules, and regulations of the U.S. Environmental Protection Agency.

ENDORSEMENTS:

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PROJECT PROPOSAL SUMMARY

Endocrine disrupting chemicals (EDCs) are increasingly being implicated as the cause of both chronic and acute impacts to marine organisms. These chemicals disrupt the normal biosynthesis of hormones, metabolism, and often impact reproduction. In south Florida and the Florida Keys, EDCs find their way into the nearshore waters from a variety of point and non-point anthropogenic sources. To date, most of the research on these chemicals in the Florida Keys has focused on the exposure of non-targeted organisms to synthetic pyrethroids and organophosphates that are associated with mosquito-control practices. However, there are many other classes of chemicals from multiple sources that may disrupt normal cellular function. Unfortunately, not many of these EDCs have been examined in the south Florida region and when they have been, the studies were ad hoc with no real strategic direction other than the vague guidance provided under the Florida Keys National Marine Sanctuary Water Quality Protection Program (WQPP). We propose to develop a strategic guidance document informed by the priorities of managers that will serve as a robust roadmap for agencies, organizations, institutions, and other stakeholders of marine resources when considering activities that will reduce the negative effects of EDCs. Through workshops coupled to rigorous literature reviews and in-person interviews, we will 1) determine and catalog the priorities of stakeholder agencies, organizations, and institutions, 2) review and analyze the current state of knowledge related to sources and impacts of EDCs in general and in the south Florida marine environment in particular, 3) identify gaps in the existing knowledge relative to the priorities identified by stakeholders, 4) identify and propose best practices related to use and control of EDCs, and 5) identify the existing statutes, regulations, policies, and management practices of agencies to determine the impediments to successfully implementing practices and policies that will mitigate the effects of EDCs on the marine resources of south Florida. Best management practices will be identified and recommendations will be made on how best to approach EDCs in the environment. We will also provide a forward-looking assessment of EDCs in a warming and more acidic ocean.

The deliverable of this project will be a strategic guidance document related to EDCs in the south Florida marine environment. This report will serve as a roadmap for agencies developing endocrine disruption research programs, policies to address the sources of EDCs, and approaches to manage and reduce the presence and effects of EDCs.

This proposal addresses the Special Study: Endocrine Disruptors Impacts on Aquatic Ecosystems – Activity W.23. More specifically, this project will directly address the priority defined in the announcement: "The report should provide information on the existing legal authorities and regulations which can be used to address the identified endocrine disruptor concerns; provide potential management activities and strategies to reduce endocrine disruptors in the Florida Keys; identify best management practices to minimize negative impacts to the marine environment; and identify areas of future research."

PROPOSAL WORKPLAN

1. Introduction for Addressing the Priority Action Items

a. Situation, Need, and Previous Efforts - Endocrine disrupting chemicals (EDCs) have become widespread in the marine environment and have been implicated in impacting the health of many marine organisms. Besides acute impacts that may result in mortality, there is an emerging literature describing the chronic effects EDCs also may cause on marine organisms including impacts to reproduction, fertility, hatchability, and the viability of offspring (Arcand-Hoy *et al.*, 1998). The impacts are often cause by impairing hormone activity and altering sexual behavior. These xenobiotics belong to diverse groups of chemicals including the alkylphenol ethoxylates (APEs) (estrogenic endocrine disrupters; see Gronen *et al.*, 1999 for a review), butyltins (causing molluscan imposex; see Matthiessen and Gibbs, 1998 for a review), polycyclic aromatic hydrocarbons (depress both female and male reproductive development; Spies and Rice, 1988), current use and banned organochlorine pesticides (impact the endocrine system; Celius and Walther, 1998), and pharmaceuticals. These compounds may find their way into the nearshore waters of the Florida Keys via a variety of point and non-point sources including sewage discharges (Kruczynski, 1999), surface water runoff (Heatwole, 1987), shipping discharges and oil spills (Zheng and Van Vleet, 1988), fish house discharges (Heatwole, 1987), discharges from the south Florida mainland (Jaap, 1984), and mosquito pesticide application (Pierce *et al.* 1996).

Mosquito-control activities are the best studied of the EDCs impacting the marine environment of the Florida Keys. The Monroe County Mosquito Control Board currently uses two mosquito adulticides both of which have been investigated extensively. The first, Naled (Dibrom®), is sprayed from a fixed wing aircraft as an ultra-low volume spray (ULV). Naled is

an organophosphate and, therefore, a cholinesterase inhibitor and is toxic to most aquatic life (Hartley and Kidd, 1983). The other adulticide used by The Monroe County Mosquito Control Board is Permethrin (Permanone® R.T.U.). It is administered by spray truck in a ULV protocol. Permethrin is a synthetic pyrethroid that paralyzes the nervous system and is highly toxic to fish. Despite this, Permanone has been found in canal surface waters and in aerial collections over nearshore waters (Pierce, 1998). Permanone has been found to be toxic to a wide suite of marine invertebrates (Anderson, 1982; Hill, 1985). The pyrethrins have known estrogenic qualities. Because drift over, and deposit into, non-targeted areas is not uncommon (Bird *et al.*, 1996; Pierce, 1998), the concern is that mosquito control pesticides may affect nearshore marine communities.

Several studies have examined pesticide application and concentrations in the non-targeted organisms in the nearshore waters of south Florida. Pierce (unpublished) has explored the effects of these pesticides on the spiny lobster. Our program has examined the effects of these pesticides on queen conch reproduction (Glazer et al., 2008), larval development (McIntyre et al., 2006; Delgado et al., 2007), and metamorphosis (Delgado et al., 2013.) Additionally, Glazer et al. (2008) under a grant funded by the EPA FKNMS WQPP characterized a much broader set of contaminants (e.g., estradiols, PAHs, metals, organochlorines, pharmaceuticals) in the Florida Keys environment. Despite the research that has been conducted on EDCs, the studies were mostly ad hoc and with no formal guidance related to a strategic direction to prioritize the research. Most studies were opportunistic based on observed impacts on the reproductive systems of organisms (Glazer et al., 2008), the cataloged impacts of endocrine disruptors on wildlife in general, and specific high-value marine species (Pierce et al., 2005).

In 1998, an Advisory Panel report was submitted to the Workshop Steering Committee of

the South Florida Ecosystem Restoration Task Force (Atkeson *et al.*, 1998). The report addressed the need to develop a strategic plan to address ecological issues in south Florida that require further action. Among the recommendations was that "pesticides, metabolites, and chemical degradation products should be screened for their endocrine disruption potential." Our proposed project builds on that recognition of the value of a strategic plan to help guide research and management by producing a strategic guidance document that will provide the roadmap for agencies and other stakeholders to conduct research and address the mangement of EDCs in south Florida and the Florida Keys. This proposal addresses the Special Study: Endocrine Disruptors Impacts on Aquatic Ecosystems – Activity W.23.

b. Objective(s) – The overall ***Goal*** of this project is to provide a vision that guides researchers to address management priorities related to EDCs, and to provide the roadmap to implementing important policies that reduce the impact and presence of EDCs in the south Florida marine environment. The ***Objective*** of this study is to develop a strategic guidance document that will guide research and management related to EDCs in south Florida. This project is not experimental so there are no hypotheses to test. Specifically, we will:

1. Review the current state of knowledge related to EDCs emphasizing south Florida,
2. Identify priorities of stakeholders as it relates to EDCs
3. Identify the research gaps critical for management decisions
4. Review existing legal authorities, legislation, and policies that address EDCs in south Florida with an emphasis on best management practices
5. Identifying and Prioritizing Areas of Future Research and Policy Development
6. Prepare a strategic guidance document that will identify and propose best management practices that reduce the impacts to the south Florida marine

environment and provide strategic guidance on future activities including timelines to address the identified activities guided by Specific, Measurable, Achievable, Results-focused, and Timely (SMART) goals and principles.

c. Applications, Benefits, and Importance - This project will provide a strategic guidance document to the agencies, organizations, and institutions responsible for conducting research, implementing legislation, and developing best management practices related to EDCs in south Florida. The document will be focused at the nexus of science and management to ensure that the recommendations are management-relevant and achievable.

Specifically, this project will address the FKNMS WQPP purpose "to identify and implement priority corrective actions within a compliance schedule to address point and nonpoint sources of pollution to maintain the chemical, physical, and biological integrity of the Sanctuary" by identifying actions which will address EDCs, and provide a structured and focused timeline related to achieving the goals associated with those actions.

This project will also address the Southeast Florida Coral Reef Initiative's Land-Based Sources of Pollution Focus Area Goals and Objectives to "... quantify and characterize the land-based sources of pollution; identify how these sources of pollution impact the coral reef; develop strategies to reduce the impact of land-based sources of pollution ...".

2. Methods and Approach

d. Description of Major Tasks - This project will be based on workshops, face-to-face meetings, and literature reviews from which a comprehensive strategic guidance document will be produced.

Activity 1. Workshop 1a. State of the Science: Workshop 1 will be a 2-day workshop in the Florida Keys. This workshop will bring together the leaders in government, NGOs, and the

private sector to describe the state of the science related to endocrine disruption and the emerging issues. We will solicit information from throughout the world for the sake of completeness; however, an emphasis will be placed on tropical regions. Managers from stakeholder agencies, organizations, and institutions (e.g., Florida Keys National Marine Sanctuary, Florida Department of Environmental Regulation, Florida Fish and Wildlife Conservation Commission, The Nature Conservancy, Mote Marine Laboratory, University of Miami, University of Florida, Organized Fishermen of Florida) will also be present so that they can be acquainted with the state of the science and they can be informed when addressing their priorities during the 2nd day of the workshop (Workshop 1b). Because of the mix of science and management in this workshop, keynote presentations from experts will present an overview of endocrine disruption in the environment and how they can impact the trust marine resources of the various agencies. Additionally, case studies will be presented.

Workshop 1b. Identifying priorities of stakeholders: The purpose of the second day of Workshop 1 will be to identify and catalog the priorities of the stakeholder groups. The focus of this workshop will be identifying the issues for each agency/organization that are associated with impacts from EDCs. This information will be used in Activity 2.

Activity 2. Gap analysis – Stakeholder Priorities and Science: This analysis will couple the state of the science with stakeholder prioritization identification to identify what critical information is lacking or incomplete to address the priorities. Recommendations related to future research activities that will help achieve the desired stakeholder's priorities will be made including specific and SMART (i.e., Specific, Measurable, Achievable, Result-focused, and Timely) actions.

Activity 3. Determining Legal Authorities, Regulations, and Best Management Practices: We will conduct a review of the existing statutes and legal authorities related to regulating EDCs and discharges. This will be accomplished by rigorous library reviews and with in-person meetings with relevant authorities (e.g., FL DEP attorneys and managers, municipal discharge regulators, EPA and other federal regulators.) The approaches taken by jurisdictions outside of south Florida will also be examined to provide a broader context for recommendations.

In association with the examination of regulatory authority, we will conduct a review of best management practices related to EDCs throughout the world. However, as before, an emphasis will be placed on tropical regions. This will provide a diverse representation of how EDCs have been addressed and will help to identify the approaches that will be most relevant for south Florida. Based on this review, we will make management recommendations using case studies and examples from other locations on how to manage and reduce EDCs in south Florida.

Activity 4. Identifying and Prioritizing Areas of Future Research and Policy Development: This activity will take the results of the stakeholder prioritization workshop and couple it to the results from Workshop 1a (State of the Science) to develop a strategic approach to research priorities in south Florida and the Florida Keys National Marine Sanctuary. It will be guided by the results of the gap analysis. The prioritization approach will be conducted using the STAPLEE method which is a rubric developed by Federal Emergency Management Agency to evaluate hazard mitigation by guiding the prioritization of response actions. We have used this approach to prioritize strategies for climate change adaptation (Glazer et al., 2017). Briefly, STAPLEE is an acronym for Social, Technical, Administrative, Political, Legal, Economic, and Environmental and is used to score potential activities related to their ability to achieve the intended results. We will adapt this method to score priorities and related actions identified by

stakeholders in Workshop 1b. We will also develop a specific timeline for the actions which will guide management related to EDCs.

Activity 5. Analysis of EDCs Under Future Climates: Because EDCs will likely have different properties under warmer and more acidic seas, we will develop a chapter to the report which will analyze the south Florida marine environment under a future climate. This chapter will focus on what is projected about the future marine conditions (e.g., using the MOM4 model to project future ocean temperatures, sensu Glazer, 2013) and couple this to the impacts of those conditions on EDCs. The physiological impacts to marine organisms under these conditions will also be examined because the effects of EDCs coupled to increasing SSTs will likely be synergistic.

Activity 6. Vetting the Results: We will present the results from this study to the stakeholders via electronic format to receive feedback so that we can adjust the results as required.

Activity 7. Outreach: The results of this project will be presented in a series of recorded webinars and an in-person workshop in the Florida Keys. We will also produce a manuscript for publication and a 2-page (front and back) factsheet for distribution.

e. Environmental Impact - This project has no field component; therefore, there will be no need for sample collection and no environmental impacts.

f. Future Efforts - The results from this project will form the basis from which future research related to endocrine disruption will originate. The strategic guidance that this document will provide will guide agencies', NGOs', and institutions' future efforts towards understanding the possible effects of EDCs on marine resources as well as approaches to mitigate those effects.

3. **Project Management** (see resumes in Attachment A)

g. Administration - The P.I., Robert Glazer, will oversee the entire project including developing agendas for the workshops, identifying participants to invite, overseeing the budgets, guiding the document development, and distributing the results.

h. Roles/Assignments and Participation Time - The team will be comprised of Robert Glazer (PI) and Logan Benedict (co-PI). Glazer will oversee the project implementation. He will also be responsible for writing the report. Benedict will organize the workshops, conduct the face-to-face meetings, and collating and analyzing the results of the workshop. He will assist in report writing.

4. Support Requirements and Conditions

i. Cooperation from Other Organizations - NONE

a. Data or Facility Access - There is no data or facility access required for this project.

5. Results/Outputs and Deliverables

m. Deliverable Items and Schedule - There are no data to be delivered with this project. However, there are deliverables. These deliverables will be associated with the Objectives of the project. The following timeline represents the schedule for deliverables for the project indicated by the red X. The final report will be submitted 6 months after the project ends (March 2020).

	2018/2019											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
Workshop 1a/1b		X										
Gap analysis			X	X	X							
Determine Legal Authorities, Regulations, BMPs					X	X	X					

Prioritizing Future Research					X	X	X	X				
EDCs Under Future Climates				X	X	X	X	X	X	X		
Progress Reports						X						X
Final Report Prep						X	X	X	X	X	X	X

6. Environmental Results – Outputs, Outcomes, and Results

n. Outputs (project products) - The specific outputs for this project are:

- Evaluation of the current state of the science related to EDCs in marine environments
- Identifying stakeholder priorities related to EDCs in south Florida and the FKNMS
- Identifying scientific gaps as they relate to stakeholders' priorities
- Prioritizing future research related to EDCs in south Florida and FKNMS
- Characterizing EDCs impact under projected future climates.
- Preparation of final report (document) that provides guidance to stakeholders for future research, policy/legislation, and mangement-related activities

Outcomes – The outcomes of the project include:

- A strategic vision for research, policy, and management of EDCs in south Florida
- An informed suite of managers and researchers of the south Florida marine resources related to the current state of knowledge and optimal direction to pursue the reduction of negative impacts associated with EDCs.

This project directly supports the EPA's 2018-2022 Strategic Plan by addressing the following sections:

Protect and Restore Water Quality: Protecting the nation's waters relies on cooperation among EPA, states, tribes, territories, and local communities and involves a suite of programs to protect

and improve water quality in the country's rivers, lakes, wetlands, and streams, as well as in estuarine, coastal, and ocean waters. EPA will foster strong partnerships with other federal agencies, states, tribes, local governments, and other organizations that facilitate achieving water quality goals while supporting robust economic growth.

External Factors and Emerging Issues: Water quality programs face challenges such as increases in nutrient loadings, nonpoint source and stormwater runoff, and aging infrastructure. EPA is carefully examining the potential impacts of and solutions to these issues. Many important water quality problems have complex causes that can only be addressed through strategic use of federal, state, tribal, and local authorities. EPA will work closely with its partners to ensure that these issues are addressed in a coordinated and effective manner, particularly where water quality issues cross jurisdictional lines. EPA is working with external partners and stakeholders to address the barriers to and incentives for ways that technology and innovation can accelerate improvements in water infrastructure and protection and restoration of waters.

o. Tracking Outputs and Outcomes – Each *output* is tied directly to the seven activities associated with the objectives of the project (Objectives Section 1b). Completion of each activity will be the measure of performance. We will track outputs based on the schedule in section 5.m above. *Outcomes* will be assessed on the number or stakeholders engaged in providing inputs to the priority part of the project (Workshop 1b) and the number of stakeholders attending the webinars and post-project workshops.

7. Literature Cited

Anderson, R. L. 1982. Toxicity of fenvalerate and permethrin to several non-target aquatic invertebrates. Environmental Entomology. 11: 1251-1257.

Arcand-Hoy, L. D., A.C. Nimrod, and W. H. Benson. 1998. Endocrine-modulating substances in the environment: estrogenic effects of pharmaceutical products. Int. J. Toxicol. 17: 139-158.

Atkeson, T. D., J. J. Delfino, T.W. La Point, S.C. McCutcheon, and J.H. Rodgers. 1998. Linking ecotoxicity and risk management to sustainable restoration of south Florida ecosystems. Advisory Panel Report to Workshop Steering Committee and Task Force. 23 pp.

Bird, S. L., D. M. Esterly, and S. G. Perry. 1996. Off-target deposition of pesticides from agricultural aerial spray applications. Journal of Environmental Quality. 25: 1095-1104.

Celius, T. and B.T. Walther. 1998. Differential sensitivity of zonagenesis and vitellogenesis in Atlantic salmon (*Salmo salar* L.) to DDT pesticides. J. Exper. Zool. 281: 346-353.

Delgado, G. A., R. A. Glazer, and D. Wetzel. 2007. The Effects of Water Quality on Embryogenesis and Larval Development of Queen Conch: Implications for Recruitment to and Coastal Development of the Florida Keys. Final Report to the South Florida Water Management District. SFWMD #OT050676. 35p.

Delgado, G. A., R. A. Glazer, and D. Wetzel.. 2013. Effects of Mosquito Control Pesticides on Competent Queen Conch (*Strombus gigas*) Larvae. Biol. Bull. 225: 79-84.

Glazer, R. 2013. Alternative Futures Under Climate Change for the Florida Key's Benthic and Coral Systems. Final Report. State Wildlife Grant FWC 6242. 39 p.

Glazer, R., Nancy Denslow, Nancy Brown-Peterson, Patricia, McClellan-Green, David Barber, Nancy Szabo, Gabriel Delgado, Kevin Kroll, Iris Knoebl, Daniel Spade. 2008. Anthropogenic Effects on Queen Conch Reproductive Development in South Florida. A Final Report. Submitted to USEPA. EPA identifier X7974799-03. 73 p.

Glazer, R. M Flaxman, J Vargas-Mereno, K. Karish and E. Ponte. 2017. Implementation of a Scenario-based Model of Adaptation Planning for the South Florida Marine Environment (KeysMAP). Final Report State Wildlife Grants #1253.

Gronen, S., N. Denslow, S. Manning, S Barnes, D. Barnes, and M. Brouwer. 1999. Serum vitellogenin levels and reproductive impairment of male Japanese medaka (*Oryzias latipes*) exposed to 4-tert-Octylphenol. Env. Health. Persp. 107: 385-390.

Hartley, D. and H. Kidd. 1983. The Agrochemicals Handbook. Nottingham, England, Royal Society of Chemistry.

Heatwole, D. W. 1987. Water Quality Assessment of Five Selected Pollutant Sources in Marathon, Florida Keys. Florida Keys Monitoring Study: 1984-1985. South Florida District. Marathon Branch Office, Marathon, Florida.

Hill, I. R. 1985. Effects on non-target organisms in terrestrial and aquatic environments. In: The Pyrethroid Insecticides. J. P. Leahy, Ed. London, Taylor and Francis.

Jaap, W. C. 1984. The Ecology of the South Florida Coral Reefs: A community profile. U.S. Fish and Wildlife Service, Office of Biological Services, Washington, D.C. FWS/OBS-82-/08.

Kruczynski, W. 1999. Water Quality Concerns in the Florida Keys: Sources, effects, and solutions. Florida Keys National Marine Sanctuary, Water Quality Protection Program, pp. 75.

Matthiessen, P. and P. E. Gibbs. 1998. Critical appraisal of the evidence for tributyltin-mediated endocrine disruption in mollusks. Environmental Toxicology and Chemistry 17: 37-43.

McIntyre, Melissa, Robert Glazer, and Gabriel Delgado. 2006. The effects of the pesticides Biomist 30/30 ® and Dibrom ® on queen conch (*Strombus gigas*) embryos and larvae: a pilot study. Proc Gulf Caribb. Fish Instit. 57:731-741.

Pierce, R. H. 1998. Effects of mosquito control measures on non-targeted organisms in the Florida Keys National Marine Sanctuary. Final report submitted to the Environmental Protection Agency. Mote Marine Laboratory. Technical Report 609, pp. 40.

Pierce, R., M. Henry, D. Kelly, P. Sherblom, W. Kozlowsky, G. Wichterman, and T. W. Miller. 1996. Temephos distribution and persistence in a southwest Florida salt marsh. J. American Mosq. Control Assoc. 12: 637-646.

Pierce, R. H., M. S.Henry ,T. C.Blum and E. M.Mueller. 2005. Aerial and Tidal Transport of Mosquito Control Pesticides into the Florida Keys National Marine Sanctuary. Rev. biol. trop vol.53 suppl.1. pp. 117-125.

Spies, R.B. and D.W. Rice. 1988. Effects of organic contaminants on reproduction of the starry flounder *Platichthys stellatus* in San Francisco Bay. Marine Biology 98: 191-200.

Zheng, W. and E. Van Vleet. 1988. Petroleum hydrocarbon contamination of the Dry Tortugas. Marine Pollution Bulletin. 19: 134-136.

8. Budget Summary

The project will require federal funding in the amount of $83,994.67. We will also commit to a voluntary cost-share of 20,627. The voluntary cost-share is detailed in section 10 below.

Personnel: We are requesting salary for Benedict at the rate of $24.4316/hr x 1440 hours for a Total Personnel $35,182.

Fringe benefits: Fringe benefits are calculated at the rate of 36.7% based on $689.80 biweekly for health insurance and co-FICA of 1.45%. Total Fringe: $12,911.79.

Travel: a) Activity 1. We estimate that we will invite 6 experts to Workshop 1a. This will cost an estimated $6,942 based on the following calculations: ((**Airfare**: 6 people x $380/flight) + (**Hotel**: 6 people x 2 nights hotel each @$195/night [Florida Keys rates]) + (**Rental car**: 3 days @ $45/day*6 people) + (**Fuel**: $55/trip * 6 people) +(**Meals**: $36/day [State rate] * 6 people) + (**per diem**: $80/trip * 6 people))

b) Activities 2-7. The budget for this subcategory is based on a total of 10 trips and totals $5,270. This was calculated as 10 trips x ((**Fuel**: $55/trip) + (**Hotel**: 2 nights/trip * $160/trip [note this is less than Activity one because this travel will likely not be to the Florida Keys where hotels are more expensive]) + (**Meals**: 2 days @$36/day [State rate]) + (**per diem**: $80/trip [State rate])

Total travel: $12,212

Equipment – no equipment

Supplies – supplies are calculate based upon software required for webinars and other MeetingSphere conferencing software ($3,260) + miscellaneous meeting supplies ($1,270)

Total supplies: $4,530.

Contractual – No contractual

Construction – No construction

Other – Activity 1 meeting rooms calculated at $1,250/day * 2 days for local facilities.

Total Other: $2,500.

Total Direct costs: $67,335

Indirect – calculated at the negotiated rate of 24.74% of total direct. Total Indirect: $16,658.88

Total Federal Request: $83,994.67

9. Programmatic Capability and Past Performance

a. Past performance – Over the past five years, we have received 4 federally-funded grants from the U.S. Fish and Wildlife Service; Glazer was PI on all of them. These include:

1. *Incorporating Climate Change Considerations into Conservation Planning and Actions for Threatened and Endangered Species in the Florida Keys* – This 2-year grant began in 2017 and is ongoing. It is workshop-based and brings together numerous stakeholders. All reports have been submitted on time and the project is on schedule. The grant focuses on State listed species in the Florida Keys and how to ensure their long-term survival under rising seas. **Budget**: $130.000 federal funds request ($70,000 match)
2. *Peninsular Florida Landscape Conservation Cooperative Targeted* - This multi -year grant started in 2016 is scheduled to be completed in April 2019. All reports to date have been submitted on time and the project is on schedule. The grant is examining Federally listed species in the Florida Keys and how to ensure their long-term survival under rising seas, how to 'manage for change', and what prevents agencies from implementing climate adaptation strategies. It was workshop-based and brought together numerous stakeholders. **Budget**: $96,015 federal funds request (no match).
3. *Projecting changes in three Florida coastal fishing communities resulting from sea level rise and the anticipated impacts to Species of Greatest Conservation Need* - This multi -year grant started in July 2016 is scheduled to be completed in December 2019. All reports to date have been submitted on time and the project is on schedule. The grant is examining how 3 fishing communities will respond to rising seas and

what it means for non-targeted and targeted species. It was workshop-based and brought together numerous stakeholders. **Budget**: $39,696 federal funds requested ($21,376 match).

4. *A Scenario-based Approach for Implementing Climate Adaptation on Public Conservation Lands* – Glazer was co-PI on this grant. This multiyear grant began in 2015 and was completed in 2017. It was workshop-based with stakeholders from numerous agencies and was designed to develop climate adaptation strategies under alternative future scenarios in the Big Bend region of Florida. All reports were completed on-time and the final report was submitted satisfactorily. **Budget**: $51,860 federal funds requested ($23,524 match).

10. **Voluntary cost share/match and other leveraged funds**

We are committing to a voluntary cost share of 4 months of Glazer's salary ($13,883) plus fringe at 48.58% of salary ($6,744) for a total of $20,627. The negotiated indirect rate of 24.74% ($5,103) is added to this for a total voluntary cost share of $25,730. This represents a total for the grant (Federal request plus cost-share) of $109.724.70 with match providing 24% of the overall grant costs.

11. **Subawards or contracts** – N/A

12. **Partnerships** – the success of this project will depend upon participation by many stakeholders. We will leverage FWC ongoing relationships with numerous resource agencies, non-governmental organizations (NGOs), educational institutions, and representatives private sector businesses. Because the focus of this project is the production of a guidance document, and because it is based on workshops, the FWC will rely on the partners to participate. See letters of support in Attachment B.

Attachment A. Resumes

ROBERT ALAN GLAZER

1130 Calle Ensenada

Marathon, Florida USA 33050

305-942-1814

e-mail: bob.glazer@gcfi.org

dob: 8 March 1956

Nationality: U.S. Citizen

HIGHLIGHTS

- Research coordinator and Principal Investigator for State of Florida's queen conch research and restoration program in the Florida Keys (29 years) including design, implementation, analysis, reporting, and publishing results of research and monitoring projects. Many projects based on partnerships with Federal (including NOAA) and State agencies, and NGO organizations and citizen-scientists. Over 15 Grants awarded with greater than $1,600,000 received. Budget tracking and personnel management are critical components of this position.
- Principal Investigator and team leader for marine climate change adaptation grant-funded projects with multiple partner agencies and institutions and leader for FWC Climate Change Research and Monitoring workgroup.
- Executive Director of multinational environmental non-governmental organization. Oversees multiple Marine Protected Area (MPA) capacity-building grant-funded projects and developed grants programs to assist MPAs in their activities. Funding was provided by NOAA and other agencies. Over 40 grants and contracts awarded with approximately $2,000,000 received. This position required interactions with partner agencies including NOAA line offices and other organizations. Budget tracking and personnel management are critical components of this position.
- 29 years of leading and conducting SCUBA diving surveys for research projects and served on Fish and Wildlife Commission's Dive Control Board setting policies and procedures for SCUBA diving safety.
- Reviewed proposed national and international environmental legislation for NOAA and other multi-national organizations for climate and other marine-related programs.
- Drafted proposal guidelines and reviewed numerous research and capacity-building proposals for multiple domestic and international environmental grant opportunities in support of resource management.
- Reviewed many scientific papers for peer-reviewed journals
- Developed and executed numerous Operating Plans, Strategic Plans, and commercial Business Plans.
- Provided technical support for research programs, development of Federal climate and research plans, and legal proceedings.
- Presented research results and management in numerous scientific and non-scientific forums. This included many presentations to the public.
- Serves as Chair of citizen-based climate change advisory committee providing information to local county commissioners on how to develop adaptation strategies to address the effects of climate change.

- Bachelors of Science degree in Fishery Biology from Colorado State University (1979)
- 2 environmental; awards: Outstanding Young Environmentalist – Florida Jaycees (1995) and Fishery Biologist of the Year – Southeast Association of Fish & Wildlife Agencies (2005).

DETAILS

EXPERIENCE

June 1990 to present

PRINCIPAL INVESTIGATOR/

RESEARCH SCIENTIST

Florida Fish and Wildlife Conservation Commission

Fish and Wildlife Research Institute

2796 Overseas Highway, Suite 119

Marathon, Florida 33050

PAID - $60,000/yr; 40+ hrs/wk

Climate Change: PI for five grant-funded projects related to climate change adaptation planning in the marine environment using scenarios. Developed the KeysMAP (Florida Keys Marine Adaptation Planning) program. These projects are multi-institutional and include social, economic, and climate variables in marine and coastal systems to develop climate change adaptation strategies for natural resources. Additional responsibilities include serving as the Leader for the FWC Climate Change Research and Monitoring Workgroup. Also served on the National Fish, Wildlife and Plants Climate Adaptation Strategy. Served as Instructor on the first National Conservation Training Center course on Scenario Planning for climate adaptation.

Queen Conch Research and Restoration Principal Investigator: Responsibilities include developing research priorities for the project, obtaining external funding through governmental and NGO grants, developing partnerships, developing collaborative relationships with outside researchers and organizations, developing student intern and community-based volunteer programs, community outreach and public relations, and publishing in peer and non-peer reviewed journals. Other research responsibilities include designing experiments, implementing research programs, data collection and analysis, tracking and managing multiple budgets, training and management of professional and technical staff as well as volunteer citizen scientists, preparing manuscripts for publication, presenting results of research at national and international fora, and to local, state, and federal management agencies. Additional responsibilities include leading and conducting SCUBA diving surveys for 29 years.

Nov 2003 to Present

EXECUTIVE DIRECTOR

Gulf and Caribbean Fisheries Institute, Inc.

Corporate Headquarters: P.O. Box 21655

Charleston, SC 29413

UNPAID – 20 hrs/week

Oversee all aspects of managing a multinational, multi-lingual non-profit organization dedicated to long-term sustainable and wise use of the marine resources in the Caribbean and Gulf of Mexico. Duties include strategic planning and visioning, budget development and tracking, identifying and applying for grant opportunities to meet strategic objectives, guiding

organization by developing initiatives, developing broad-ranging partnerships to achieve objectives, representing the organization in regional and international fora. Corporate responsibilities include ensuring a robust governance structure and overseeing all other activities including budgeting, public relations, developing marketing strategies and materials, personnel management, and developing contracts with outside organizations and contractors. Webmaster for www.gcfi.org. Responsible for developing and maintaining robust relationships with governmental and non-governmental organizations Other responsibilities include developing and implementing grant programs, advertising grant opportunities, organizing proposal review committees, and critically reviewing proposals for funding.

Oct 2014 to February 2018

CHAIR

Monroe County Climate Change Advisory Committee

Monroe County, Florida Keys, Florida

UNPAID – 8 hrs/month

Chair of the Monroe County Climate Change Advisory Committee which makes recommendations to the Board of County Commissioners regarding appropriate mitigation and adaptation policies needed to address climate change issues. Prepared Resolutions and created draft recommendations for adoption by the BOCC. This is a position appointed by a County Commissioner.

Jan 2011 to Sept 2011

CONSULTANT

Ecoscape Consulting to SOFRECO

Food and Agriculture Organization of the United Nations

PAID - $22,000 per contract (3 months)

Assessed the current state of knowledge related to fisheries-independent surveys of queen conch populations throughout the Caribbean region. Conducted training classes for CARICOM country biologists in queen conch biology and in-field surveys including the use of GIS and analyses for developing harvest quotas. Prepared reports related to activities and assisted with developing a queen conch fisheries independent survey manual for the Caribbean.

Nov 1999 to Nov 2003

CHAIRMAN OF THE BOARD OF DIRECTORS

Gulf and Caribbean Fisheries Institute

UNPAID – 20 hrs/week

Two-year volunteer position overseeing all operations of large, multinational Non-Governmental Organization with representatives of over 25 nations or island groups in the greater Caribbean and Gulf of Mexico region. Responsibilities include developing vision, defining priorities and initiatives, web-site development, fund raising, grant writing, and developing partnerships with governments, NGOs, commercial interests, and academic institutions in the region. Oversaw other aspects of organization including budgets, organization of annual conference, and sub-committee operations (Latin-American, publications). Coordinated and obtained funding for special Marine Protected Area symposium at 52nd GCFI. Wrote strategic plan for GCFI. Defined short-term and long-term goals. Wrote mission and vision statements. Currently serving as Chair of Caribbean Marine Protected Areas Management Network an Forum (CaMPAM) and GCFI Education Initiative committees. Organized and oversaw meetings of the Board of Directors. Program Chairman for the 1999 and 2004 meetings of the Gulf and Caribbean Fisheries Institute which included organization and development of program.

Sep 1994 to Sep 1996

CONSULTANT

Technical and financial consultant to corporation building commercial queen conch farm in the Bahamas and Florida. Engineered all culture systems including hatchery, nursery and growout. Prepared business plan for each facility for presentation to investors. Conducted marketing research and cost analyses/feasibility for business plan. Prepared proposal and met with Bahamian fisheries managers for permitting review.

Dec 1986 to Jun 1990

ASSISTANT RESEARCH SCIENTIST

Florida Fish and Wildlife Commission

$26,000 / yr; 40 hrs / week

Assisted principal investigator of queen conch research program in all aspects of queen conch research in south Florida. Organized and supervised field surveys of wild populations. Designed and built two hatcheries to culture conch for experimental releases. Wrote manuscripts for publication and presented results of research at scientific fora.

Mar 1984 to Aug 1985

ALGAE, NURSERY, GROWOUT MANAGER

Caicos Conch Farm

Turks and Caicos Islands

British West Indies

Responsibilities included design, construction, implementation, and management of the algae, nursery, and growout systems for the first commercial queen conch

hatchery. Also included were larval culture, isolation of the native algae Caicos Isochrysis (CISO), operation of egg farm to supply egg masses for larviculture, diagnosis and control of larval diseases. Also, responsible for budgeting, personnel management, inventory control, public relations, and staff training

Mar1982 to Mar 1983

DIRECTOR OF RESEARCH - AQUACULTURAL ENGINEER

Aquaculture Research Company

Boulder Creek, California

$18,000/yr; 40+ hrs/wk

Supervisor and director of research for commercial algaculture company. Designed, constructed, and integrated culture, pond, harvesting, drying, aeration, circulation, and quality control systems for small scale *Spirulina* culture facility. Also solar, wind, and geothermal applications to aquaculture. Research into production of *Dunaliella* for beta - carotene production including modification and testing of high efficiency harvest system for unicellular algae. Designed and engineered $5 million southern California algae production facility Instituted first courses at the School of Environmental Technology in aquaculture. Management of staff of eleven.

Dec 1980 to Feb 1982

DIRECTOR OF ALGAE CULTURE/LARVAL AND SPAT BIOLOGIST

Pigeon Point Aquaculture Center

Pescadero, California

$24,000/yr; 40+ hours/wk

Culture and maintenance of algae as food stock for bivalves. Design of expanded algae system. Design of algae system for Mexican hatchery. Algae training director for their technicians. Monitored growth and condition of broodstock, larval, setting, and post set (spat) cultchless oysters and clams.

Jul 1980 to Dec 1980

ASSISTANT FISHERIES BIOLOGIST

Wyoming Game and Fish Commission

Jackson, Wyoming

Jul 1979 to Dec 1979

Two five month appointments involving population and ecology studies on Jackson Lake and the Snake River.

AWARDS

1993 Outstanding Young Environmentalist for State of Florida - Florida Junior Chamber of Commerce

2005 Southeast Association of Fish and Wildlife Agencies Fisheries Biologist of the Year

EDUCATION

B.S. Degree. Fishery Biology. Colorado State University, Fort Collins, Colorado. 1979

PROFESSIONAL ORGANIZATIONS

American Association for the Advancement of Science

Gulf and Caribbean Fisheries Institute - Board of Directors

COMPETITIVE GRANTS AWARDED (list available upon request)

Florida Fish and Wildlife Commission – 15 Grants awarded; Over $1,600,000 received

Gulf and Caribbean Fisheries Institute – over 40 grants and contracts awarded; approximately $2,000,000 received

RELEVANT PUBLICATIONS (of over 40).

Glazer, R. A. 2000. Comparison of reproductive deficits between non-spawning queen conch populations in the Bahamas and Florida Keys: project summary. Caribbean Marine Research Center project C-00-PROG-01-00A 9 p.

Glazer, R. A. and Delgado, G. A.. Towards a holistic strategy to managing Florida's queen conch (*Strombus gigas*) population. pp 73-80: En: Aldana Aranda, D. (Ed.) 2003. El caracol *Strombus gigas*: conocimiento Integral para su manejo sustenable en el Caribe. CYTED. Programa Iberoamerican de Ciencia y Tecnologia para Desarolllo. Yúcatan, México.

Glazer, R., Nancy Denslow, Nancy Brown-Peterson, Patricia, McClellan-Green, David Barber, Nancy Szabo, Gabriel Delgado, Kevin Kroll, Iris Knoebl, Daniel Spade. 2008. Anthropogenic Effects on Queen Conch Reproductive Development in South Florida. A Final Report. Submitted to USEPA. EPA identifier X7974799-03. 73 p.

Glazer, R. M Flaxman, J Vargas-Mereno, K. Karish and E. Ponte. 2017. Implementation of a Scenario-based Model of Adaptation Planning for the South Florida Marine Environment (KeysMAP). Final Report State Wildlife Grants #1253.

Glazer, R. A. and I. Quintero. 1998. Observations on the sensitivity of queen conch to water quality: implications for coastal development. Proc. Gulf Caribb. Fish, Inst. 50:78-93.

Berg, C. J., R. A. Glazer, J. Carr, J. Krieger, and S. Acton. 1992. Status of queen conch, *Strombus gigas,* in Florida waters. Proc. Gulf and Caribb. Res. Instit. 42:439-443.

Berg, C. J., Jr., and R. A. Glazer. 1995. Stock assessment of a large marine gastropod (*Strombus gigas*) using randomized and stratified towed-diver censusing. _ Rapp, P._v. Réun. Cons. int. Explor. Mer, 199:247-258.

Delgado, G. A., R. A. Glazer, and D. Wetzel. 2007. The Effects of Water Quality on Embryogenesis and Larval Development of Queen Conch: Implications for Recruitment to and Coastal Development of the Florida Keys. Final Report to the South Florida Water Management District. SFWMD #OT050676. 35p.

Delgado, G. A., R. A. Glazer, and D. Wetzel.. 2013. Effects of Mosquito Control Pesticides on Competent Queen Conch (Strombus gigas) Larvae. Biol. Bull. 225: 79-84.

Kearney, K. A., M. Butler, R. Glazer, C. R. Kelble, J. E. Serafy, and E. Stabenau. 2014. Quantifying Florida Bay Habitat Suitability for Fishes and Invertebrates Under Climate Change Scenarios. Environmental Management. ISSN 0364-152X DOI 10.1007/s00267-014-0336-5 54(3)

McCarthy, K. J., C. T. Bartels, M. C. Darcy, G. A. Delgado, J. R. Styer and R. A. Glazer. 2000. Habitat induced reproductive failure of queen conch, Strombus gigas, in the Florida Keys: a final report. U.S.F.W.S. Project P-3. Partnerships for Wildlife. 30 p.

McCarthy, K.J., C.T. Bartels, M.C. Darcy, G.A. Delgado, and R.A. Glazer. 2002. Preliminary observation of reproductive failure in nearshore queen conch (*Strombus gigas*) in the Florida Keys. Proceedings of the Gulf and Caribbean Fisheries Institute 53: 674-680.

McIntyre, Melissa, Robert Glazer, and Gabriel Delgado. 2006. The effects of the pesticides Biomist 30/30 ® and Dibrom ® on queen conch (Strombus gigas) embryos and larvae: a pilot study. Proc Gulf Caribb. Fish Instit. 57:731-741.

Spade DJ, Griffitt RJ, Liu L, Brown-Peterson NJ, Kroll KJ, Feswick A, et al. (2010) Queen Conch (Strombus gigas) Testis Regresses during the Reproductive Season at Nearshore Sites in the Florida Keys. PLoS ONE 5(9): e12737. https://doi.org/10.1371/journal.pone.0012737

LOGAN BENEDICT

EDUCATION

Master's of Science – Biology, University of Illinois Springfield, completion May 2015

- Thesis work involving aquatic ecological restoration and monitoring at The Nature Conservancy's Emiquon
    - Analysis of aquatic communities of bacteria, algae, rotifers, crustacean zooplankton, fish, aquatic vegetation, and physical and chemical parameters.
    - Field sampling of planktonic and benthic communities
    - Data processing, management, and multivariate statistical analysis
    - Experience with multitude of sampling tools and techniques
- Relevant coursework:
    - Biological Research and Policy 1 & 2, Biometrics, Advanced Ecology and Evolution, Restoration Ecology, Global Change Ecology, Conservation Biology, Advanced Cellular and Molecular Biology, Multivariate Statistics

Bachelor of Arts – Zoology, Southern Illinois University Carbondale, completed May 2012

- Relevant Coursework:
    - Wildlife Administration and Policy, Animal Behavior, Undergraduate Research, Conservation Biology, Freshwater Invertebrates, Food Webs and Energetics, Ecology, Zoology 1 & 2, Developmental Biology, Conservation Aquaria, Genetics, Biology 1 & 2, Field Techniques, 1 year of Statistics courses.

WORK EXPERIENCE

- Climate Adaptation Coordinator – Florida Fish and Wildlife Research Institute, South Florida Marine Research Lab, Marathon, FL, October 2016-Current
    - Leading efforts on climate adaptation planning for Federally Threatened and Endangered, State listed, and Species of Greatest Conservation Need in the Florida Keys
    - Coordinate efforts with federal agencies, state agencies, researchers, NGOs, local governments, and special interest groups
    - Leading workshops, conference calls, and meetings on climate adaptation with multiple stakeholders
    - Synthesis of high volumes of information, and writing of technical reports

- Climate Adaptation Coordinator- Florida Fish and Wildlife Conservation Commission, North Central Regional Office Lake City, FL, August 2015-Current
    - Leading workshops, conference calls, and meetings on climate adaptation with multiple stakeholders

- Coordinate efforts with federal agencies, state agencies, and researchers
- Analyze future uncertainty in the Gulf Coast of Florida
- Utilize scenario planning to reduce future uncertainty in management activities
- Downscale current climate projections for public managed land use
- Synthesis of high volumes of information, and writing of technical reports

- Field and Lab Technician- Illinois River Biological Station, Illinois Natural History Survey, Havana, IL, June 2015-August 2015
  - Assistance with electrofishing surveys in the Mississippi and Illinois River
  - Fyke, mini-fyke, hoop, and mini-hoop fish sampling in the Illinois River
  - Data entry for needed projects
  - Zooplankton sampling, identification, and processing
  - Supervised operation of vehicles, boats, other equipment

- Education and Outreach Coordinator – Therkildsen Field Station at Emiquon, University of Illinois Springfield, May 2014 –April 2015
  - Field science workshops for ages K-Senior
  - Planning and execution of scientific conferences
  - Biological field research and data processing
  - Boat and sampling gear operation
  - Supervision of undergraduate hourly workers
  - Writing and creation of donor newsletters, brochures, social media outreach
  - Coordination and cooperation with other research groups, universities, government organizations, and non-government organization.

- Project and Data Manager – The Illinois Environmental Protection Agency (IEPA), Bureau of Land, Springfield IL, August 2013-May 2014
  - Database management
  - Paperwork and permitting of restoration projects
  - Generation and presentation of federal and state financial and timeline reports

- Lab technician – SIUC Freshwater Ecology Lab, March 2012-July 2012
  - Data entry and management
  - Sample processing, specimen gut analysis

- Lab technician – SIUC Herpetology Lab, March 2011-March 2012
  - Specimen collection and processing for Chytrid fungus
  - Analysis of histology slides for presence of Chytrid fungus
  - Care for lab group frogs and culture of feeder insects

- Zookeeper – Scovill Zoo, Decatur, IL, December 2008-April 2010
    - Worked as a swing keeper, attending to all animals in zoo as necessary. Range of care from invertebrates, aquatics, reptiles, amphibians, small mammals, birds, hoof stock, and large carnivores including American alligators.
    - Responsibilities included: preparation and food delivery, heavy stocking work, exhibit cleaning, design and maintenance, animal enrichment activities, daily record keeping, assist on veterinary trips, administer medications as necessary, and training and handling as necessary.
    - Lead Educational Mobile Zoo Programs, Animal Encounters, and Birthday Parties while supervising volunteers.

PROFESSIONAL MEMBERSHIPS

Society for Freshwater Science, March 2015-present

Society for Ecological Restoration: National and Midwest Chapter, Jan 2015-present

Treewalkers International/Amphibian Stewards Network, 2009-2010

Society for the Study of Amphibians and Reptiles 2010-2011

ADDITIONAL EXPERIENCES

Poster and oral presentations at:

Florida Rare Plant Task Force _Jacksonville FL, April 2018

Extension of Professional Associations of Florida (EPAF) _ Daytona Beach FL, August 2017

International Society for River Science (ISRS) _ La Crosse WI, August 2015

Society for Freshwater Science (SFS) – Milwaukee WI, May 2015

Midwestern Chapter of Society for Ecological Restoration (MWSER) – Chicago IL, March 2015

Emiquon Science Conference (ESC) – Lewistown IL, February 2015

Student Arts and Research Symposium (STARS) – Springfield IL, April 2014

Emiquon Science Conference (ESC) – Lewistown IL, February 2014

Attachment B. Letters of Support

The Nature Conservancy
Protecting nature. Preserving life.

Florida Keys Office
127 Industrial Road, Suite D
Big Pine Key FL 33043

Tel: (305) 872-7071
Fax: (305) 872-7072
nature.org

June 11, 2018

To whom it may concern:

I am writing to endorse the proposal submitted by the Florida Fish and Wildlife Conservation Commission entitled, "*A strategic approach to evaluating the role of endocrine disrupting chemicals on the south Florida marine environment with an analysis of current knowledge, informational gaps, and research needs.*" As a long-term member of the Florida Keys National Marine Sanctuary Advisory Council and the Sanctuary's Water Quality Protection Program Steering Committee, The Nature Conservancy has long recognized the need to address endocrine disruptors in the Florida Keys marine environment and recognizes the value of approaching this issue strategically with an emphasis on the needs of natural resource managers. We are excited that the proposed project addresses that need. We are also confident of the ability of the project team to produce a professional, useful, and valuable document to guide the efforts of the agencies and organizations seeking to reduce the effects of these chemicals.

Thank you for considering out strong support for the Commission's proposal.

Sincerely,

Chris Bergh
South Florida Program Manager

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Florida Keys National Marine Sanctuary
33 East Quay Road Key West, FL 33040
Phone: (305) 809-4700 Fax: (305) 293-5011

June 11, 2018

To whom it may concern,

The Florida Keys National Marine Sanctuary (FKNMS) has been in discussion with Dr. Robert Glazer regarding the project he is submitting to the EPA Special Study grants program: Endocrine Disruptors Impacts on Aquatic Ecosystems – Activity W.23. This project would involve the development of a strategic approach to understanding the role of endocrine disrupting chemicals in the south Florida marine environment. We fully support this effort and believe it can help provide strategic guidance related to Endocrine Disruptors (EDCs) in the south Florida marine environment.

This project is of high priority to the FKNMS because 1) we recognize EDCs to be an understudied yet important stressor impacting marine resources; and 2) there is a need for strategic approach to address how to focus future efforts towards EDC research, policy, legislation, and management to reduce the negative impacts from these chemicals on the resources in the region.

FKNMS supports the approach of the FWC in developing a strategic guidance document to address EDCs and are committed to partner with FWC in the activities undertaken as a part of this project.

Please do not hesitate to contact me if you need additional information.

Sincerely,

Andrew Bruckner, Ph.D.
Sanctuary Research Coordinator
Florida Keys National Marine Sanctuary
33 East Quay Road
Key West, FL 33040
(305) 809-4728